Freight and Goods Transportation System (FGTS) 2003 Update

March, 2004

Prepared by:
Washington State Department of Transportation
Strategic Planning and Programming Office
Office of Freight Strategy and Policy

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Executive Summary

This is the third update of the Washington Freight and Goods Transportation System (FGTS) since the Transportation Commission adopted the original report in 1995. The FGTS identifies the highways and roadways most heavily used by trucks and provides factual data to support funding for projects that improve conditions for freight transportation.

Using this system, state highways, county roads and city streets are classified according to the average gross annual truck tonnage they carry. The tonnage classifications used are as follows:

T-1	more than 10 million tons per year
T-2	4 million to 10 million tons per year
T-3	300,000 to 4 million tons per year
T-4	100,000 to 300,000 tons per year
T-5	at least 20,000 tons in 60 days

Washington's Strategic Freight Corridors are those routes that carry four million or more tons of freight annually (T-1 and T-2). The 2003 FGTS Update covers only T-1 and T-2 roadways at the state, county and city level. Additional city street data was also included where available. Tonnage values were derived from truck traffic count data, converted into average weights by truck type.

The miles of state T-1 and T-2 roadways increased steadily in the 1990s but have leveled off since 2000. Since tonnage data is derived from vehicle counts, these results indicate that the number of trucks on the road has also remained fairly constant since 2000. In 2003, 34 percent of all state route miles were designated either T-1 or T-2, totaling 2,430 miles. T-1 roads accounted for 1,084 miles (15%) and T-2 roads accounted for 1,346 miles (19%).

Even though the percentage of T-1 and T-2 state routes remained the same from 2000 to 2003, there were some mileage changes between the tonnage designations. In 2003, 13.5 miles rose in tonnage classification from T-2 to T-1 and 78 miles rose from T-3 to T-2. A total of 35 miles dropped from T-2 to T-3. In all, slightly over 130 state route miles changed designation since the 2001 FGTS update, with a net gain of 43 miles to the T-1/T-2 set in 2003.

With this update, it was possible for the first time to compare classification changes at the county level. Between 2001 and 2003, the number of county T-1/T-2 miles dropped from 280 to 262 miles, a loss of 18 miles representing a 6% change. King County was the only county where approximately 2 miles of T-2 roadway moved up to T-1.

The use of truck gross tonnage data alone to designate a freight and goods transportation system presents a narrow view of overall freight movement on one hand, but provides practical and useful information on the other. The tonnage-based road ranking system presented in the 2003 FGTS Update identifies the most heavily used commercial trucking routes, and this information supports planning for pavement upgrades, traffic congestion management and other investment decisions. Tonnage data is more readily available than other kinds of freight data, enabling the FGTS to be periodically updated at relatively low cost.

The Washington State Department of Transportation is currently engaged in development of a comprehensive 20-year transportation plan for the state. The new plan, to be completed by July 2005, will include substantial freight transportation and economic emphasis. It is likely that any expansion of the current FGTS tonnage-based model or freight system modeling will be deferred until the 20-year plan is completed, at which time the elements and direction of a revised freight system could be considered.

Freight and Goods Transportation System 2003 Update

I. Introduction

This is the third update of the Washington Freight and Goods Transportation System (FGTS) since the Transportation Commission adopted the original report in 1995. Today, almost ten years later, the importance of freight mobility to Washington's economy is greater than ever. The FGTS identifies the highways and roads most heavily used by trucks and provides factual data to support funding for projects that improve conditions for freight transportation. This edition of the FGTS provides updated tonnage information for the most heavily traveled roadways at the state, county, and city levels.

As with past editions, this update can be used to establish project eligibility for Freight Mobility Strategic Investment Board grants, support Highways of Statewide Significance (HSS) designation, and fulfill other federal reporting requirements for truck and traffic counts. The information can be used by political leaders, transportation managers and planners to assess statewide freight needs and impacts.

II. History of the Freight and Goods Transportation System (FGTS)

In 1993, the Washington State Legislature enacted RCW 47.05.021 directing the Washington State Transportation Commission to designate a freight and goods transportation system (FGTS). The Commission adopted the first report in 1995 (Resolution No. 516).

Over time, efforts to develop freight policy and identify freight deficiencies in the state have taken place, and each subsequent update of the FGTS has reflected this work. The other freight-related efforts have included

- a 1994 Cost Responsibility Study that focused on identification of freight and goods system deficiencies and a needs estimate for all-weather roads;
- a 1996 Freight Mobility Advisory Committee (FMAC) appointed by the Legislative Transportation Committee for development of freight policy recommendations;
- a 1997 WSDOT Freight Mobility Project Prioritization Committee formed to provide criteria for ranking freight mobility projects;
- a 1997 Eastern Washington Freight Mobility Advisory Committee (EWFMAC) appointed by the Legislative Transportation Committee to focus on freight corridors and investments in eastern Washington;
- the 1998 creation of the state Freight Mobility Strategic Investment Board (FMSIB), established by the legislature in RCW Chapter 47.06A to review and recommend funding for the most strategic freight mobility projects;

- from 1994-1999, the Eastern Washington Intermodal Transportation Study (EWITS), a research effort to forecast future freight needs, identify gaps and pinpoint critical system improvements in eastern Washington and elsewhere in the state;
- a 2000 state appropriation to the County Road Administration Board (CRAB) to develop a County Freight and Goods System (CFGS) that provides data consistent with WSDOT's FGTS;
- the 2001 creation of the WSDOT Office of Freight Strategy and Policy to provide leadership and coordination of the department's freight activities;
- since 2001 and ongoing, the Strategic Freight Transportation Analysis (SFTA), a statewide research effort patterned after EWITS to gather truck commodity flow and origin/destination information, and other information highlighting freight movement in the state.

The Washington FGTS was updated in 1998, 2001 and now, in 2003.

III. The FGTS Tonnage Classification System

Using this system, state highways, county roads and city streets are classified according to the average annual gross truck tonnage they carry. Freight corridors with statewide significance, usually designated as Strategic Freight Corridors, are those routes that carry an average of four million or more gross tons by truck annually. The tonnage classifications used for designating the FGTS are as follows:

T-1	more than 10 million tons per year
T-2	4 million to 10 million tons per year
T-3	300,000 to 4 million tons per year
T-4	100,000 to 300,000 tons per year
T-5	at least 20,000 tons in 60 days

The 2003 FGTS Update covers only T-1 and T-2 roadways at the state and county level. City street data for T-1 through T-5 classifications was included where available.

IV. Methods Used in Preparing the 2003 FGTS Update

State Highway Data

The state highway data is the assemblage of approximately 1700 count locations statewide, an increase of approximately 250 data collection points since 2001. Traffic data from permanent and short count locations where classification data is available was used to estimate the truck tonnage for state highways. The state has 36 permanent counter locations that collect vehicle weight data. These were used to validate the tonnage values in calculations for each truck type. See Appendix A for more information on data validation.

County Road Data

For the original 1995 FGTS study, each county conducted classification counts on its existing and potential truck routes. To provide the best information possible, some counties worked with trucking concerns to develop tonnage data.

Since then, counties have included classification studies in their annual traffic counting program. This provided the number of trucks in each of the three truck categories for the 2003 FGTS Update (see Figure 1). WSDOT methodology described in Appendix I: *Instructions for FGTS Truck Tonnage Estimation* was used to convert this information to gross annual tons. WSDOT methodology was used so that the designation of truck route classes would be consistent between state and county roadways.

City Street Data

The WSDOT Highways and Local Programs Office, assisted by the Association of Washington Cities (AWC), requested updated street tonnage data from all cities for incorporation into this FGTS update (Appendix H). Guidance was provided to the cities to promote consistency in reporting street classification and tonnage data (see Appendix I). Responding cities included Auburn, Bellevue, Burien, Camas, Coulee City, Federal Way, Olympia, Renton, Spokane, Sprague, Tieton, and Union Gap. For all other city information, data from the 2001 FGTS was carried forward.

Converting Traffic Count Data to Tonnage

The annual truck tonnage for a specific route is estimated using the average annual daily traffic (AADT), truck percentage, truck type, and working days per year.

A summary of vehicle classification types, including trucks, is found in Figure 2. For purposes of this analysis, trucks are defined to include all trucks 2 axle (6 tired) or larger. They also include larger 2 axle (4 tired) delivery vehicles such as express package delivery vans, bread trucks, or any commercial vehicle. Private pickups, vans, or recreational vehicles are not included. To aid in calculating annual tonnage, trucks are divided into 3 categories, as shown in Figure 1:

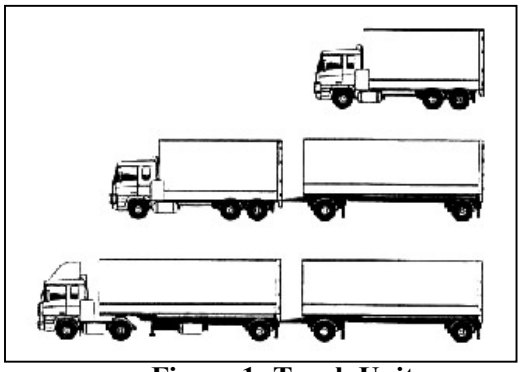


Figure 1: Truck Units

Single Units- a single vehicle including dump trucks, mixers, regardless of the number of axles.

Double Units- a 2 unit vehicle, normally a truck and trailer, generally with 4 to 6 axles. This category is basically any truck up to 80,000 lbs. Older double trailers can be included in this category.

Trains (Triple Units) - Normally a tractor and 2 trailers. Basically any truck rated from 80,000 lbs. to 105,000 lbs. One notable exception is gasoline tankers; the 8 axle truck and trailer type should be included in this category

Figure 2: Vehicle Classification Guide

In calculating the approximate freight tonnage, the following average weights were used:

Singles	**7 tons**
Doubles	**27 tons**
Trains	**42 tons**

For a complete discussion of the procedures used for estimating FGTS truck tonnage, see Appendix A: *Validation of Data* and Appendix I: *Instructions for FGTS Truck Tonnage Estimation.*

Assumptions Made When Interpreting the Data

The 2003 FGTS Update team reviewed statewide tabular and graphic truck tonnage data for errors and inconsistencies. The refined data was reprocessed by the WSDOT Transportation Data Office (TDO) to portray state freight corridors accurately. When analyzing traffic data, the TDO relied on best professional judgment to make assumptions and minor adjustments and compared 2001 data with current data to correct anomalies, add couplets, and reconcile route continuity issues.

Sometimes the exact location of data collection points creates a confusing scenario, such as when data indicate that freight tonnage drops significantly at a particular road location, but there is no opportunity at that location for the freight traffic to exit (i.e., no off ramp or pull-out). Where this was detected in the 2003 data, unless some reasonable explanation was found, the freight traffic was assumed to continue on to the next exit opportunity and the FGTS tonnage class mileage was adjusted accordingly.

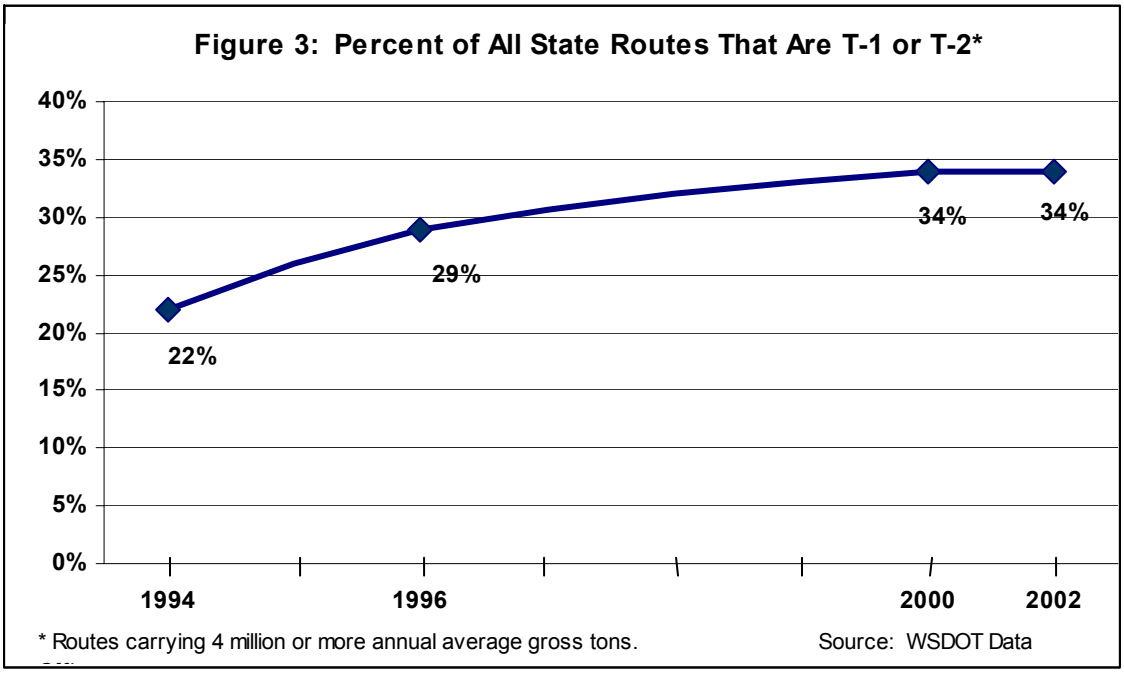
The TDO also compared the county CFGS data to the WSDOT FGTS data for consistency where state and county routes intersect. The team reviewed the data for intersections where the county road freight designation was greater than that of the state route and corrected inconsistencies.

V. Results and Findings of the 2003 FGTS Update

General maps showing T-1 and T-2 state routes statewide and in the Puget Sound Region can be found in Appendix B. Highly detailed maps for state routes, county roads and city streets are contained in a separate, electronic FGTS atlas on CD-ROM, available from WSDOT. The 2003 FGTS state route tabular data is presented in two different formats. The information is listed in order by state route (SR) number in Appendix C and listed in order by county in Appendix D. Appendix E contains a summary of FGTS state route classification changes from 2001 to 2003. County road and city street data is presented in Appendix F and a summary of county tonnage classification changes from 2001 to 2003 is found in Appendix G.

As seen in Figure 3, the miles of state roadways that annually carry 4 million average gross tons or more (T-1 and T-2) increased steadily in the 1990s but have leveled off since 2000. Tonnage data is derived from vehicle counts, and these results indicate that the number of trucks on the road has also remained fairly constant since 2000. In 2003, 34 percent of all

state route miles were designated either T-1 or T-2, totaling 2,430 miles. T-1 roads accounted for 1,084 miles (15%) and T-2 roads accounted for 1,346 miles (19%).



Even though the percentage of T-1 and T-2 state routes remained the same from 2000 to 2003, there were some mileage changes between the tonnage designations. In 2003, 13.5 miles rose in tonnage from T-2 to T-1 and 78 miles rose from T-3 to T-2. A total of 35 miles dropped from T-2 to T-3. In all, slightly over 130 state route miles changed designation since the 2001 FGTS update, with a net gain of 43 miles to the T-1/T-2 set in 2003. For more information on where these changes occurred, see Appendix E.

With this update, it was possible for the first time to compare average gross tonnage changes at the county level between 2001 and 2003. The county CGTS data was first provided for the 2001 update, and for the second time in 2003. In 2001, there were 280 county centerline miles of T-1 and T-2 roadways. In 2003, this number dropped to 262 miles, a loss of 18 miles representing a 6% change. King County was the only county where approximately 2 miles of T-2 roadway moved up to T-1. More details about these changes are found in Appendix G.

VI. Considerations for Future Updates

The identification or designation of a freight and goods transportation *system* for Washington State is a challenging task. The use of truck average gross tonnage data alone to make this designation presents a narrow view of overall freight movement on one hand, but provides practical and useful information on the other. The tonnage-based road ranking system presented in the 2003 FGTS Update identifies the most heavily used commercial trucking routes, and this information supports planning for pavement upgrades, traffic congestion

management and other investment decisions. Tonnage data is more readily available than other kinds of freight data, enabling the FGTS to be periodically updated at relatively low cost.

However, trucks and roads represent only one part of the intermodal network that moves freight and goods. A number of elements were identified by the 2003 FGTS Update team that could be considered in the development of a more comprehensive Washington freight system. These include

- publish updated T-3 through T-5 roadway gross tonnage information
- identify traffic delay impacts
- identify freight chokepoints
- incorporate ITS technology and data (weigh-in-motion, travel times, etc.)
- identify route designation for hazardous materials, over-height and overweight loads
- consider economic value of cargo
- consider perishability of cargo
- consider time-sensitivity of cargo
- consider freight origin/destination
- consider commodity type
- identify distribution centers and intermodal transfer points
- identify and assess other modes of freight movement

Emerging sources of freight information and data include, but are not limited to, the Strategic Freight Transportation Analysis (SFTA) research project, the Commercial Vehicle Information Systems Network (CVISN), research studies by the Washington State Transportation Center (TRAC) and others, and traffic counters placed on strategic freight corridors. New data from these sources, combined with WSDOT's transportation data can lead to modeling of a freight system in ways that were not previously possible.

The Washington State Department of Transportation is currently engaged in development of a comprehensive 20-year transportation plan for the state. The new plan, to be completed by July 2005, will include substantial freight transportation and economic emphasis. It is likely that any expansion of the current FGTS tonnage-based model or freight system modeling will be deferred until the 20-year plan is completed, at which time the elements and direction of a revised freight system could be considered.

Appendix A

Validation of Data

Validation Of The Average Weight Per Truck Class

Validation of the average weights of single, double, and triple unit trucks used in estimating the tonnage from truck percentages derived from field counts was accomplished by using WSDOT Automatic Data Collection (ADC) weigh-in-motion site data (WIM), Commercial Vehicle Information System & Networks (CVISN) data, and Strategic Freight Transportation Analysis (SFTA) data. Both CVISN and SFTA data were collected at weigh stations throughout the state. The collection at these locations does not represent a total sample for single unit trucks since only trucks weighing 26,000 pound or more need to enter the weigh stations. Single unit trucks averaged 14 tons, which is double the average weight when all single unit trucks are weighed. The CVISN and SFTA data are more accurate for double and triple unit trucks than the WIM data due to the calibration difficulties of the WIM sites.

All site data show the average vehicle weight by class is relatively constant for all state highways.

The default weight values for each truck class used in previous FGTS updates were:

	Average Weight (Tons)
Single Unit Trucks	7
Double Unit Trucks	27
Triple Unit Trucks	42

The combined average weights per class from the three data sources (discussed below) are:

	Average Weight (Tons)
Single Unit Trucks	7
Double Unit Trucks	27
Triple Unit Trucks	37

A sensitivity analysis was performed to determine the effect of using the lower tonnage for triple unit trucks and it was found due to the relatively low volumes of triple unit trucks that there was minimal change to the T designations so the continued use of the default values used in previous updates is recommended.

Data Sources

1. WSDOT Weigh-In-Motion (WIM)

Data were available for thirty-six locations. The average weight per class is given below:

Data for triple unit trucks appears to be low which may be to calibration. WIM sites are calibrated to double unit trucks.

	Average Weight (Tons)
Single Unit Trucks	7
Double Unit Trucks	27
Triple Unit Trucks	34

2. Commercial Vehicle Information System & Networks (CVISN)

Data were available from six locations. The average weight per class is given below:
Data for double and triple unit trucks is acceptable to use from this source however the single unit values are not acceptable since only trucks weighing over 26,000 pounds are required to use the scales. This eliminates most of the single unit trucks on the roadway.

	Average Weight (Tons)
Single Unit Trucks	14
Double Unit Trucks	22
Triple Unit Trucks	40

3. Strategic Freight Transportation Analysis (SFTA)

Data were available for twenty-seven locations. The average weight per class is given below:
Data for double and triple unit trucks is acceptable to use from this source however the single unit values are not acceptable since only trucks weighting over 26,000 pounds are required to use the scales. This eliminates most of the single unit trucks on the roadway.

	Average Weight (Tons)
Single Unit Trucks	14
Double Unit Trucks	31
Triple Unit Trucks	37

Appendix B

General Maps of 2003 FGTS T-1 and T-2 State Routes

Appendix C

2003 FGTS State Route Data Sorted by State Route

Appendix D

2003 FGTS State Route Data Sorted by County

Appendix E

Summary of 2003 FGTS State Route Data Changes From 2001 to 2003

Appendix F

2003 County Road and City Street Freight Route Data

Appendix G

Summary of 2003 County Road Freight Route Changes from 2001 to 2003

Appendix H

Request to Cities for FGTS Data

November 20, 2003

Attention: All Cities

The Washington State Department of Transportation (WSDOT) Highways & Local Programs is assisting in the update of the state's Freight & Goods Transportation System (FGTS), a database of the state's strategic freight corridors. The system includes highways, county roads, and city streets that carry significant volumes of freight, and we want to make sure that the data for your city is accurate.

The FGTS data is used to comply with both state and federal requirements as well as provide policy makers with information for enhancing the economic vitality of Washington State. For example, the Freight Mobility Strategic Investment Board uses this data to determine which routes are eligible for funding. In addition, the new Transportation Budget used T-1 and T-2 classes as a factor in determining projects.

Routes are classified according to the amount of freight they carry each year. The tonnage designations are:

T-1	more than 10 million tons per year
T-2	4 million to 10 million tons per year
T-3	300,000 to 4 million tons per year
T-4	100,000 to 300,000 tons per year
T-5	at least 20,000 tons in 60 days

Please review the attached information for accuracy, which identifies T-1 and T-2 routes for cities. Note any changes that need to be made: identifying and/or changing the "T" classification for any streets resulting from increases or decreases to the tonnages carried, or additions or deletions of streets identified in the FGTS. You may find the enclosed guidance sheet helpful in considering any modifications.

Submit any changes for your city to Stephanie Tax, WSDOT Highways & Local Programs, PO Box 47390, Olympia, WA 98504-7390, or e-mail taxs@wsdot.wa.gov.

We greatly appreciate your cooperation and timely response for this update. We request that any revisions you may have be returned by **December 17**, **2003**.

Appendix I

Instructions for FGTS Truck Tonnage Estimation

FGTS Classes

For the current update, the FGTS classes have been revised upon recommendation of the Freight Mobility Advisory Committee. The revised classes are:

T-1 Over 10 million gross tons annually
T-2 4 to 10 million gross tons annually
T-3 300,000 to 4 million gross tons annually
T-4 100,000 to 300,000 gross tons annually
T-5 Over 20,000 gross tons in 60 days

Trucks

This includes all trucks, 2-axle (6-tired) or larger. It should also include larger 2-axle (4-tired) delivery vehicles (UPS, bread trucks, any commercial vehicle). It does not include private pickups, vans, or recreational vehicles. To aid in calculating annual tonnage, trucks are divided into 3 categories:

Single units—a single vehicle including dump trucks, mixers, regardless of the number of axles.

Double units—a 2-unit vehicle, normally a truck and trailer, generally from 4 axles to 6 axles. This category is basically any truck up to 80,000 lbs. Older double trailers (Consolidated Freightways, Viking, etc.) can be included in this category.

Trains—normally a tractor and 2 trailers. Basically any truck rated from 80,000 lbs. to 105,000 lbs. One notable exception is gasoline tankers—the 8-axle truck and trailer type should be included in this category.

In calculating the approximate freight tonnage, the following average weights may be used:

Singles	**7 tons**
Doubles	**27 tons**
Trains	**42 tons**

CALCULATION EXAMPLES

For an example of the tonnage calculation we will assume that a person counts traffic for 4 hours and records the following:

Vehicle Type	Count by Type	Percent of Trucks
Single trucks	79	55 %
Double trucks	60	42 %
Trains	5	3 %
Cars	600	
Total	**744 (144 = trucks)**	

The next item needed is the average daily traffic and truck traffic as a percentage of the total volume. This must be obtained from the best source available, whether actual counts or modeled estimates. For the purposes of this example, let's say that the ADT is accurately known to be 2,400 vehicles per day, with 18 % trucks.

The calculation of tonnage is then:

{ADT * percent of ADT that are trucks * percent of trucks that are singles * average gross weight for singles * 250 working days per year}
+ {ADT * percent of total trucks * percent of trucks that are doubles * average gross weight for doubles * 250 working days per year}
+ {ADT * percent of total trucks * percent of trucks that are trains * average gross weight for trains * 250 working days per year}
= **freight in tons per year.**

or, for the example above;

(2400 * 0.18 * 0.55 * 7 * 250}
+ (2400 * 0.18 * 0.42 * 27 * 250}
+ (2400 * 0.18 * 0.03 * 42 * 250}
= **2,155,680 tons per year, or a T-3 class roadway or street.**

Using the above example, if the ADT is not reliably known then an approximation of the truck volumes would be the four-hour count multiplied by 3; this "12-hour" method is less accurate but it is quick and provides a reasonable estimate:

(79 * 3 * 7 * 250}
+ (60 * 3 * 27 * 250}
+ (5 * 3 * 42 * 250}
= **1,906,500 tons per year, or a T-3 class of roadway or street.**

If the truck type distribution is not known then a different method of calculation can be made using an average weight of 17 tons per truck.

ADT * Percent trucks * average truck weight * working days in a year
= freight tonnage;

or

2400 * 0.18 * 17 * 250
= **1,836,000 tons per year, or a T-3 class of roadway or street.**

The Freight and Goods Transportation System update can be reliably done using any of the three methods.